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ABSTRACT

The focus of a study (a follow-up to work by Rosenthal and others which has indicated that teacher expectancies are fulfilled in student performance) was the kind of teacher behavior which might eventuate following the experimental manipulation of an expectancy which could affect the performance of students. Subjects were female undergraduate teachers (Ts) N=26) and randomly selected sixth and seventh graders (Ss) (N=104) from a midwestern school. Each T was given a lesson plan designed to maximize discussicn and IQ scores (randomly assigned and bearing no relation to Ss' actual ability) for each of the four students in her 40-minute microteaching class. Using a specially developed observation instrument, observers categorized behavior in terms of six types of teacher reaction to student statements. Other data was obtained using the Rokeach Dogmatism Scale (Form E) to assess Ts' authoritarianism and the questionnaire to check the credibility of the experimental manipulations and to obtain information about Ts' perceptions of Ss' behavior. Two-way analyses of variance with repeated measures were employed in analyzing data. Support was found for the so-called "interaction quality hypothesis." Ts did not differ in the amount of attention given to allegedly "gifted" and "nongifted" Ss, but the pattern of attention and praise did differ. An attempt to relate differential teacher behavior to dogmatism was unsuccessful. (JS)

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PYGMALION ANALYZED:

Toward an Explanation of the Rosenthal-Jacobson Findings[1]

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In their highly publicized book, Pygmalion in the Classroom, Rosenthal and Jacobson (1968) report the astounding finding that experimentally created teacher expectations resulted in changed performance on the part of students. At the beginning of the school year teachers were told to expect intellectual growth from certain of their students. Even though these potential "bloomers" had been randomly selected from the class, they nevertheless fulfilled the prophesy, showing greater IQ gains over the course of a year than did a group of control students.

Such intriguing results do not easily go unnoticed. Predictably enough, they also do not go unchallenged. Thus numerous studies and reviews have reconsidered the "pygmalion phenomenon" with mixed results and varied conclusions. (Claiborne, 1969; Meichenbaum et al., 1969; Minor, 1970; Snow, 1969; Thorndike, 1968; Thorndike, 1969.) But whether or not the pygmalion phenomenon is real or illusory it is of importance to determine whether and/or how expectancies affect teacher behavior. Most certainly, if it is finally determined that teachers' expectations do indeed eventuate in reliable changes in student performance, one would have to inquire more specifically into the intervening teacher-student interactions which directly affect student behavior. Such is the task of the present study. More specifically, the goal is to test one hypothesis regarding the effects of teacher expectations on teacher-student interaction. This hypothesis is drawn from Rosenthal's work and can be referred to as the "interaction quality" hypothesis.

Rosenthal and Jacobson only speculate as to "how teachers brought about intellectual competence simply by expecting it" (Rosenthal and Jacobson, 1968). Their data indicate that there was no difference in the amount of time teachers spent with the students in the two groups, thus suggesting that

> it may have been more a matter of the type of interaction which took place between the teachers and their pupils which served as the determinant of the expected intellectual gains (Rosenthal and Jacobson, 1968, p. 152).

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This "interaction quality" hypothesis has appeared before, as the preferred explanation in the research on the effect of experimenter bias (Rosenthal, 1966). In some of these experimenter bias studies Es actually admit that they behaved or felt differently toward their "bright" and "less than bright" Ss (Rosenthal, 1966; Rosenthal and Fode, 1963; Rosenthal and Lawson, 1964).

The interaction quality hypothesis, however, is still only speculative. The studies on experimenter bias did not identify specific E-S interaction. The more recent classroom study (Rosenthal and Jacobson, 1968) also did not investigate just what teacher behaviors could be influencing student performance. In an unsuccessful attempt at replication of this study, Claiborne (1969) apparently made an attempt to consider teacher-student interactions, but he provides no data on this variable. Meichenbaum et al., (1969) in a study which confirmed the Rosenthal-Jacobson findings, specifically and systematically considered teacher-student interactions. Employing the very global categories of "positive," "negative," and "neutral" they found some basis for concluding that expectations influenced the quality of teacher-student interaction, but in a complex and not easily interpretable manner. Two teachers increased their positive interaction with "special" students; one teacher decreased her negative interactions with "special" students. Thus expectations differentially affected the quality of the teachers' interaction with the expectancy students. Since the Meichenbaum et al., study involved only four teachers, their mixed results from very general categories cannot be taken as definitive support for the interaction quality hypothesis. What is needed is more detailed and extended consideration of teacher-student interaction following the manipulation of teacher expectations.

One goal of the present research, then, was to find out whether or not varying teacher expectations eventuated in differential teacher-student interactions. Another question was also considered. Assuming that giving teachers an expectancy affects their behavior, it is doubtful that all teachers are similarly affected. Two decades of research on authoritarianism (Kirscht and Dillehay, 1967) would suggest that degree of authoritarianism may well mediate an individual's conformity

to an imposed set or expectancy. Accordingly, it was hypothesized that individuals high in this trait would be more susceptible to an expectancy influence than those low in authoritarianism.

Method

Subjects

Two different groups participated in this study. One group, referred to as teachers (Ts), was composed of 26 female undergraduates enrolled in a child development course. All Ts expressed interest in teaching as a career, but none had yet done her student teaching. Although Ts were volunteers, their instructor did allow them to participate in this study in lieu of a term project. It must be emphasized that Ts knew nothing of the experimental manipulations; they thought they were participating in a pilot microteaching project being conducted to give them additional teaching experience.

The other group participating in the study is referred to as students (Ss). It included 104 sixth and seventh graders from a middle school in a small midwestern city. These Ss were randomly selected and given no instructions about how they were to behave.

Measurement procedures

A major problem of the present study was to find a procedure for effectively analyzing the quality of teacher-student interaction relative to the purposes of the research. Most measures of teacher-student interaction (Flanders, 1960; Perkins, 1964) or interpersonal behavior in groups (Weick, 1968) are not readily adaptable to microteaching situations. Moreover, the rather general analysis which these rating systems typically provide would not reveal the validity of the interaction quality hypothesis. A special instrument was therefore developed.

This instrument requires a trained observer to record the incidence of six different teacher behaviors. These six indexes are: (1) teacher attention to students' statements, subdivided into attention to requested statements and attention to spontaneous student statements; (2) teacher encouragement of students' statements; (3) teacher elaboration of students' statements; (4) teacher ignoring of students' statements; (5) teacher praise of students' statements; and (6) teacher criticism of students' statements. A detailed description of this observational procedure may be found in Rubovits (1970). It should be added that this instrument appears to provide sufficiently reliable assessment of teacher behavior. In a preliminary check before proceeding with the study, dual raters were employed and interrater agreement was found to be 90 percent or above in all categories.

In addition to assessing transactions in the microteaching situation, personality and questionnaire data were obtained. An attempt was made to assess Ts' authoritarianism with the Rokeach Dogmatism Scale, Form E (Rokeach, 1960). A questionnaire was used to check on the credibility of the experimental manipulations and to obtain information about Ts' perceptions of Ss' behavior.

Experimental procedure

Approximately one week prior to teaching, each T was given a lesson plan which outlined the topic to be taught and which suggested points that could be covered. The topic of television was selected as one which would readily elicit the participation of sixth and seventh graders and would allow for a considerable amount of teacher-student interaction. The lesson plan was designed to maximize discussion and also to allow Ts considerable freedom in adding and omitting points as well as in creating new examples. The Ts were reminded, however, to keep in mind the two objectives of the lesson: (1) to gather general information about these Ss' viewing habits and (2) to get suggestions about possible class projects for a

unit on television. Along with the lesson plan Ts were also given a brief description of Ss they would be meeting. Principally, they were told that they would be teaching a group heterogeneous in terms of ability, since this "most closely approximates the typical classroom situation."

For each teaching session there was a different group of four Ss. The Ss were brought to an unused classroom where the study was conducted and where T was waiting. Before Ss arrived T was given a seating chart which not only contained each S's first name but also an IQ score and a label indicating whether or not he had been selected from the school's gifted program or from a "regular" track. The IQ scores and labels had been randomly assigned to Ss and bore no relation to Ss' actual ability. It was hypothesized that Ts formed different sets or expectations for those Ss with high IQs and the label gifted than they did for those Ss with lower IQ's and the label nongifted.

When given the seating chart, T was told to familiarize herself with the names and to examine closely the scores and labels above each name. When Ss arrived, T asked each S to sit in the seat designated on the chart. This procedure allowed T to identify each S by name. As she seated each S, T was told to look directly at each S and to read again to herself the IQ score and the label for that particular S, in order to become as thoroughly acquainted with the child's competence as possible. The T then introduced herself, explaining that she had come from the University of Illinois to try out some new teaching materials with them.

Meanwhile, an observer (O) seated herself two rows behind Ss and began categorizing T's behavior as soon as T had seated Ss and introduced herself. The O categorized behavior for 40 minutes although the teaching session itself lasted for 43 to 60 minutes. It should be stressed that O was not aware of which two Ss had been labeled gifted and which two nongifted.

After the teaching session, O and T discussed what had taken place, with O being careful not to reveal the random assignment of IQ scores and labels. Each T was then administered the postexperimental questionnaire as well as the Dogmatism Scale. A month later Ts were given a thorough explanation of the study; the nature of the experimental manipulations was described and the possible implications of the results were discussed.

Results

Interaction analysis

The observation of Ts was conceptualized as a measurement operation. The frequency counts collected on each T were considered to be the same as test scores, thus allowing for the combining of scores. Each T met with two different kinds of Ss, "gifted" and "nongifted"; each kind of S was viewed as a test. Every T made a score on each test, i.e., for every T a certain number of observations were recorded for her interaction with "gifted" Ss and a certain number for her interaction with "nongifted" Ss. These scores were treated as repeated measures of the same individual. The individual observations can properly be considered as ordinal data, just as responses to individual (dichotomously scored) test items are ordinal measures. In the same way that we treat the sums of individual test item responses (total scores) as if they were interval data, so can we proceed with the frequency observations of the interactions as if they were interval data.

In the present case, two-way analyses of variance with repeated measures (Winer, 1962) were employed.[3] Dogmatism, high and low on the basis of a median split, was the nonreplicated main effect; "gifted"-"nongifted" was the replicated main effect. A separate analysis was conducted for each dependent measure of teacher interaction with "gifted" and "nongifted" Ss.

Table 1 presents the mean number of teacher responses recorded in each category with "gifted" and "nongifted" Ss. Table 2 presents the results of the separate ANOVA's.

(Tables 1 and 2 about here.)

First consider the differences in teacher interaction with "gifted" and "nongifted" Ss, or the differences due to label. Only for two of the categories are there statistically significant differences in teacher interaction with "gifted" and "nongifted" Ss.

Across all Ts, significantly more statements were requested of "gifted" Ss than of "nongifted" Ss (category 1B). Also across all Ts the statements of "gifted" Ss were praised significantly more times than were the statements of "nongifted" Ss (category 5). Significant differences for these two categories had been predicted. It also had been expected that there would be no significant difference in the total amount of attention paid to "gifted" and "nongifted" Ss. Implicit in the interaction quality hypothesis is the assumption that the amount of interaction remains constant across Ss. It is, presumably, the variation in the quality of that interaction that is critical. Since the difference due to labeling for category 1 (total attention) was not significant, it appears that in accord with the interaction quality hypothesis the amount of teacher-student interaction was not markedly affected by the expectancy conditions. What was predicted, and substantiated, was the hypothesis that there would be significant differences in the amount of teacher initiated interaction with "gifted" and "nongifted" Ss. Conversely it was expected that there would be no significant differences in category 1A (attention to unsolicited statements). In effect this category provided a measure of the amount of student initiated interaction. No significant differences in this category allows for the inference that there was little difference in the spontaneity of verbasity of Ss. Gifted Ss were not, therefore, called upon more because they volunteered less than "nongifted" Ss. The differential recognition noted in category 1B apparently is attributable to the expectancy effect.

For the other four categories significant differences due to label had been predicted, but none of these hypotheses was supported. The Ts showed no difference in the amount of criticism of "gifted" and "nongifted" Ss. They did not ignore the statements of one type of S more than the statements of the other type. Finally, Ts did not differentially encourage or elaborate upon the statements of one type of S.

Consider now the effect of level of dogmatism on teacher interaction. There were no significant differences in the behavior of Ts high in dogmatism and Ts low in dogmatism as measured by these categories. It had been predicted that there would be a significant interaction between the effect of labeling and the level of dogmatism. This prediction was not supported for any of the categories. It, therefore, must be concluded that the behavior of these 26 Ts did not indicate in any way that highly dogmatic teachers are more affected by the labeling than are teachers lower in dogmatism.

Credibility of the experimental situation

Through a postexperiment interview and questionnaire, an extensive check was made on whether or not Ts accepted the experimental situation as it was presented to them. Although they were given ample opportunity to do so, no T expressed any suspicion of the hypothesis being tested. Furthermore, when Ts were asked to give their own personal evaluations of the students, they expressed marked agreement with the randomly assigned labels. Fifty-two students had been labeled "gifted" and 52 "nongifted," but only in the case of eight of the "gifted" Ss and three of the "nongifted" Ss did Ts express any reservations or disagreement with the labels. These data, as well as clinical observations obtained in the postexperiement interview, suggest overwhelmingly that Ts not only accepted the situation as planned but also interpreted the behavior of Ss through the lens of a label.

Discussion

This study was conducted not to replicate the expectancy effect, but to make a start at explaining it. In this regard the results provide support for the interaction quality hypothesis which was suggested by Rosenthal and Jacobson (1968) and was supported to some extent by Meichenbaum et al. (1969).

In the present study, "gifted" Ss were called upon more and were praised more than "nongifted" Ss. It is, of course, possible to speculate that Ts in this study, being inexperienced, may have been scared of bright students and so were oversolicitous of them, seeking out their opinions and being sure to praise them often. Whether or not the same results would be obtained with experienced teachers can only be answered by attempting to replicate these results with experienced teachers. However, Meichenbaum et al. (1969) included one teacher, experienced, who responded to expectancy students by increasing her positive interaction with them.

It is, of course, interesting to speculate as to how calling upon and praising expectancy students more could lead to improved academic performance by these students, if in fact teachers in other studies that found an expectancy effect (Rosenthal and Jacobson, 1968; Meichenbaum et al., 1969) behaved as Ts in this study did. Being given more of an opportunity to participate in the class could cause expectancy students to clarify their thoughts more through dialogue with the teacher and to demonstrate their proficiency more frequently. Receiving more praise has far-reaching implications for improving the students' motivation and learning. From the present study, however, nothing can be concluded about S performance, given these differences in T performance. More research is needed to replicate this study's findings and to investigate the effects of differences in teacher behavior on student performance.

It had been expected that differences between interaction with "gifted" and "nongifted" Ss would also appear in the categories of ignoring, elaboration, encouragement, and criticism. That such did not occur may be an experimental artifact. If the lesson had allowed for less student discussion and demanded more clear-cut exhibitions of competence, such differences might have been found. Quite

possibly the teacher behaviors of ignoring, elaborating, and encouraging deserve further consideration in different teaching situations. As for the category of teacher criticism, it may well be that with the existence of strong cultural proscriptions regarding negative treatment of students, variations will not manifest themselves in the amount of criticism of "gifted" and "nongifted" Ss.

That dogmatism did not have the predicted effect on Ts' behavior is a disappointing, but not altogether surprising finding. After all the n was small (26), the sample relatively homogeneous, and the median split did not yield extremes of any real magnitude. The matter, however, ought to be pursued further.

All in all, the study has provided important evidence to the effect that teacher expectations do affect teacher behavior. Moreover, it appears that teacher behavior is affected in such a way that it is not unlikely that student performance would be influenced in the manner reported by Rosenthal and Jacobson (1968). However, a word of caution is in order inasmuch as the originally predicted differences did not occur in four out of six cases. As indicated previously, there seem to be valid reasons in each case why these expectations were not confirmed. Nevertheless one might wonder whether the two confirmed predictions may in the overall scheme of things be best attributed to chance in spite of the high significance levels found in each instance. Certainly statistical theory does not necessarily lead to that conclusion. The probability of obtaining two significant differences out of a total of six predictions is less than .05 assuming the truth of a null hypothesis. Be that as it may, further work on the problem is indicated and, indeed, is already in progress (Rubovits and Maehr, 1971) to lend further support to the hypothesis that expectations influence the quality of teacher-student interaction.

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Footnotes

1. Support for this project was in part provided by the Office of the Superintendent of Public Instruction of the State of Illinois. The present report is based on an M.A. thesis written by the first author under the direction of the second author. The authors gratefully acknowledge the assistance of Decatur, Illinois, school officials, particularly Mr. Don Woods. The help and support of Professors James Wardrop and Robert Stake is also gratefully acknowledged.

2. Requests for reprints should be sent to Martin L. Maehr, Department of Educational Pychology, University of Illinois, Urbana, Illinois 61801.

3. A seemingly more straight forward approach might involve the use of difference scores as the dependent measure. However, as Manning and DuBois (1962) point out, a major problem is inherent in the use of such scores, viz., the reliability of difference scores tends to decrease as the correlation between the scores increases. Therefore, it seems preferable where possible to avoid the use of such composite measures and thus in the present case a repeated measures design employing a "gifted" and "nongifted" score separately seems preferable.

Table 1.--Means and Standard Deviations of Interactions with "Gifted" and "Nongifted" Students by Teachers High and Low in Dogmatism

	"Gifted"	"Nongifted"		"Gifted"	"Nongifted"		"Gifted"	"Nongifted"
	Total attention			Attention to unsolicited statements			Attention to requested statements	
High D	51.24 (17.20)	43.41 (20.17)	High D	38.77 (13.73)	38.31 (17.16)	High D	12.46 (7.14)	5.00 (3.28)
Low D	50.00 (17.02)	47.92 (16.44)	Low D	37.69 (18.37)	40.92 (12.04)	Low D	12.31 (9.57)	7.00 (8.95)
Combined	51.00 (17.20)	45.00 (18.24)	Combined	38.23 (16.76)	39.62 (14.90)	Combined	12.38 (8.43)	6.00 (6.66)
	Encouragement			Elaboration			Ignoring	
High D	11.77 (7.54)	13.38 (8.04)	High D	6.38 (8.66)	5.38 (3.38)	High D	11.54 (7.94)	12.92 (11.11)
Low D	12.46 (7.10)	11.85 (6.20)	Low D	7.54 (4.14)	8.08 (3.67)	Low D	11.77 (8.64)	11.38 (8.17)
Combined	12.12 (7.20)	13.62 (7.18)	Combined	6.69 (4.99)	6.73 (3.85)	Combined	11.27 (8.30)	12.15 (9.78)
	Praise			Criticism				
High D	9.85 (9.91)	5.54 (5.81)	High D	1.46 (1.55)	2.08 (3.63)			
Low D	10.00 (8.86)	7.08 (5.25)	Low D	1.69 (1.27)	1.77 (1.72)			
Combined	9.89 (10.17)	6.31 (5.44)	Combined	1.54 (1.44)	1.92 (2.85)			

Note: S.D.'s are given in parentheses below the respective means.

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Table 2.--Analysis of Variance of Labels and Dogmatism

Source	df	MS	F
(A) ANOVA of Labels and Dogmatism in Category 1 (Total Attention)			
Between			
Dogmatism (D)	1	78.77	.16
Ss within	24	476.81	
Within			
Labels (L)	1	232.69	1.13
D x L	1	60.31	.30
L x Ss within	24	205.29	
(B) ANOVA of Labels and Dogmatism in Category 1A (Attention to Unsolicited Statements)			
Between			
Dogmatism (D)	1	7.69	.02
Ss within	24	318.04	
Within			
Labels (L)	1	24.92	.12
D x L	1	44.31	.21
L x Ss within	24	204.99	
(C) ANOVA of Labels and Dogmatism in Category 1B (Attention to Requested Statements)			
Between			
Dogmatism (D)	1	11.08	.12
Ss within	24	93.67	
Within			
Labels (L)	1	529.93	17.33*
D x L	1	15.17	.49
L x Ss within	24	30.58	
(D) ANOVA of Labels and Dogmatism in Category 2 (Encouragement)			
Between			
Dogmatism (D)	1	16.17	.07
Ss within	24	98.12	
Within			
Labels (L)	1	3.25	.13
D x L	1	12.33	.49
D x Ss within	24	24.99	

Table 2.--Analysis of Variance and Labels and Dogmatism (cont.)

Source	df	MS	F
(E) ANOVA of Labels and Dogmatism in Category 3 (Elaboration)			
Between			
Dogmatism (D)	1	5.56	.04
Ss within	24	121.31	
Within			
Label (L)	1	3.25	.06
D x L	1	10.17	.18
L x Ss within	24	66.34	
(F) ANOVA of Labels and Dogmatism in Category 4 (Ignoring)			
Between			
Dogmatism (D)	1	15.85	.48
Ss within	24	33.16	
Within			
Label (L)	1	.69	.07
D x L	1	14.16	1.44
L x Ss within	24	9.84	
(G) ANOVA of Labels and Dogmatism in Category 5 (Praise)			
Between			
Dogmatism (D)	1	11.17	.74
Ss within	24	15.20	
Within			
Label (L)	1	167.33	5.40*
D x L	1	4.61	.15
L x Ss within	24	30.94	
(H) ANOVA of Labels and Dogmatism in Category 6 (Criticism)			
Between			
Dogmatism (D)	1	.08	.01
Ss within	24	6.67	
Within			
Label (L)	1	1.92	.03
D x L	1	.69	.10
L x Ss within	24	6.97	

* $p < .01$

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